The opinion in support of the decision being entered today is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte ULRICH SESEKE-KOYRO, ANDREAS BECKER, and JOACHIM FREHSE

Appeal 2007-0501
Application 10/747,956
Technology Center 1700

Decided: Marc h 23, 2007

Before CHUNG K. PAK, CHARLES F. WARREN, and CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 8 through 12 in the Office action mailed April 7, 2005.[1] 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 41.31(a) (2005).

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[1] Claims 13 through 17, also of record, have been withdrawn from consideration by the Examiner under 37 C.F.R. § 1.142(b).

The appeal was heard on March 6, 2007.

We affirm the decision of the Primary Examiner.

Claims 8 through 12 illustrate Appellants' invention of an alkali metal fluorozincate in certain grain spectrum ranges:

8. A fine alkali metal fluorozincate produced by reacting alkali metal hydroxide, zinc oxide, and alkali metal fluoride or hydrogen fluoride in aqueous phase, wherein alkali metal hydroxide and zinc oxide are mixed into a suspension and hydrogen fluoride is added, said fine alkali metal fluorozincate having a grain spectrum in which 50% of all particles have a diameter $< 5\ \mu m$.

9. An alkali metal fluorozincate according to claim 8, wherein the alkali metal is potassium.

10. A potassium fluorozincate according to claim 9, having a grain spectrum in which 50% of all particles have a diameter $< 3.8\ \mu m$.

11. A medium alkali metal fluorozincate produced by reacting alkali metal hydroxide, zinc oxide, and alkali metal fluoride or hydrogen fluoride in aqueous phase, wherein hydrogen fluoride and zinc oxide are mixed with one another and alkali metal hydroxide is added, said medium alkali metal fluorozincate having a grain spectrum in which 50% of all particles have a diameter $< 11\ \mu m$.

12. A coarse alkali metal fluorozincate produced by reacting alkali metal hydroxide, zinc oxide, and alkali metal fluoride or hydrogen fluoride in aqueous phase, wherein hydrogen fluoride and zinc oxide are mixed with one another and alkali metal fluoride is added, said coarse alkali metal fluorozincate having a grain spectrum in which 50% of all particles have a diameter $> 11\ \mu m$.

The Examiner relies on the evidence in these references:

Shimajiri	US 4,989,775	Feb. 5, 1991
Popoola	US 5,723,187	Mar. 3, 1998
Seseke-Koyro (Seseke-Koyro '641)	WO 99/48641 A1	Sep. 30, 1999
Lauzon	US 6,105,850	Aug. 22, 2000

Appellants request review of the following grounds of rejection under 35 U.S.C. § 103(a) (Br. 4-5), the grounds all advanced on appeal:

claims 8 through 11 as unpatentable over Seseke-Koyro '641 or Lauzon, either in view of Popoola (Answer 3-4); and

claim 12 as unpatentable over Seseke-Koyro '641 or Lauzon in view of Shimajiri (*id.* 4-5).

We have relied on US 6,432,221 to Seseke-Koyro (Seseke-Koyro '221) of record as a translation of Seseke-Koyro '641 because Appellants state Seseke-Koyro '641 "is equivalent to" Seseke-Koyro '221 (Br.[2] 4; *see also* Reply Br. 1:26). Indeed, the Examiner refers to Seseke-Koyro '221 in the Answer (Answer, e.g., 7:5).[3]

Appellants argue the appealed claims as a group as well as argue claims 8, 10, 11, and 12 individually, with claim 9 standing or falling with claim 8 (Br. 6, 7, 8, and 10-12). Thus, we decide this appeal based on appealed claims 8, 10, 11, and 12 as representative of the grounds of rejection and Appellants' groupings of claims. 37 C.F.R. § 41.37(c)(1)(vii) (2005).

The Examiner contends Seseke-Koyro '221 and Lauzon disclose potassium fluorozincate as a fluxing agent for aluminum brazing (Answer 3 and 4). The Examiner concludes this is a disclosure of substantially similar products to that claimed sufficient to render product-by-process claims 8, 10, and 11 prima facie obvious (*id.*). With respect to these claims, the Examiner further contends Seseke-Koyro '221 and Lauzon do not

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[2] We consider the Brief filed March 21, 2006.

[3] We have not considered the translation of Seseke-Koyro '641 prepared for the USPTO by FLS, Inc. (June 2006) which is attached to the Answer.

disclose the particle size of the potassium fluorozincate (*id.* 4). The Examiner contends Popoola discloses a flux containing fluoride salts for brazing aluminum which is applied as a solution by spraying, wherein the particle size of the flux is controlled at < 10 μm, with at least 70% of the particles having a diameter of 2-4 μm, to maintain at least 25% by volume of the particles in suspension without stirring (*id.*, citing col. 2, ll. 18-26). The Examiner concludes it would have been obvious "to obtain potassium fluorozincate of either Seseke-Koyro or [Lauzon], by optimizing the conditions of the process of making such product, or by pulverizing . . . or agglomerating" to achieve a particle size of < 10 μm as suggested by Popoola to use the same as a flux in a brazing process (*id.*).

With respect to claim 12, the Examiner contends Seseke-Koyro '221 and Lauzon do not disclose the particle size of the potassium fluorozincate (Answer 4-5). The Examiner contends Shimajiri discloses a fluoride flux powder having a particle size of 15 μm on average (*id.* 5). The Examiner concludes it would have been obvious "to obtain potassium fluorozincate of either Seseke-Koyro or [Lauzon], by optimizing the conditions of the process of making such product, or by pulverizing . . . or agglomerating" to achieve a particle size of 15 μm on average as suggested by Shimajiri to use the same as a flux in a brazing process (*id.*).

Appellants contend one of ordinary skill in the art would not have found any motivation in the references to combine Seseke-Koyro or Lauzon with Popoola or Shimajiri because the two sets of references relate to distinctly different materials (Br. 6). Appellants contend the primary references relate to potassium fluorozincate salts which are distinctly

different from the potassium aluminum salts disclosed by Popoola and the complexes of potassium fluoride and aluminum fluoride disclosed by Shimajiri (*id.*). Appellants contend the distinct differences between the materials would not have motivated one of ordinary skill to apply the teachings of the aluminum-based fluoride salts to alkali metal fluorozincate salts, including the teachings of desired size of the aluminum based salts disclosed in Popoola and Shimajiri (*id.* 6-7). Appellants further contend there is no reasonable expectation that the proposed modification of the particle size of potassium fluorozincate salts of the primary references would be successful on the basis of the teachings with respect to materially different aluminum-containing fluoride salts in Popoola and Shimajiri (*id.* 7-8).

Appellants contend there is no basis to modify the particle size of the potassium fluorozincate salts in the teachings of a particle size of less than 10 micrometers to maintain potassium aluminum fluoride salts in solution without stirring in Popoola (Br. 8). Appellants argue there is no reason the teachings with respect to potassium fluoride salts in Popoola apply to the distinctly different chemical substance potassium fluorozincate salts of Seseke-Koyro and Lauzon (*id.*). Appellants further contend the Examiner has not identified the process conditions which would be optimized to result in a particle size of less than 10 micrometers, arguing that "Popoola merely discloses that the particle size of a double fluoride salt can be controlled" (*id.* 9; original emphasis deleted). Appellants contend the applied references fail "to recognize that the sequence by which reactants are combined can affect particle size" and thus, there is no basis to optimize the

processes of the primary references to produce the claimed alkali metal fluorozincates (*id.*). Appellants contend the claimed "alkali metal fluorozincate salts having a desired particle size can be prepared by drying the product of an aqueous reaction without the need for additional processing (i.e., without pulverizing)" (*id.* 9-10; original emphasis deleted). Appellants argue "[t]he particle size and . . . distribution of alkali metal fluorozincates can be controlled during the synthesis of the particles by selecting the reagents used to form the particles and controlling the order in which the reagents are combined" and there is no basis to modify the processes of Seseke-Koyro or Lauzon in this respect (*id.* 10).

Appellants contend independent claim 8 specifies a particular order of combining particular reagents results in the claimed fine particle size distribution in this claim and in dependent claim 10 which is not specified in the applied references (Br. 10-11). Appellants submit the same contentions with respect to the particular reagents and the order of combining the same to obtain certain particle size distributions specified in each of independent claims 11 and 12 and the teachings of the references (*id.* 12).

The Examiner responds the references can be combined because they all relate "to the use of a fluxing agent (or a flux) to bond or braze aluminum substrates" (Answer 6). The Examiner contends Seseke-Koyro and Lauzon disclose potassium fluorozincate as a commercially available fluxing agent for brazing aluminum substrates by wet applications, such as spraying, or dry applications, but not the particle size (*id.* 6-7). The Examiner contends Popoola discloses applying the material as a slurry or

suspension of smaller particle sizes and Shimajiri prefers a dry method of larger particle sizes, and thus, it would have been obvious to select the particle size for the method employed (*id.*). The Examiner contends that Popoola and Shimajiri are cited to teach the particle size, and it would have been obvious to subject potassium fluorozincate to additional process steps determined by routine experimentation, such as pulverizing processes, to obtain the desired particle size dependent on the method of applying the fluxing agent (*id.* 7-8 and 9). The Examiner contends potassium fluorozincate is analogous to potassium fluoroaluminate as disclosed by Lauzon at column 1, lines 5-11, and as disclosed in the secondary references (*id.* 8). The Examiner contends the disclosure in the references of a method of selection and order of combining reagents to prepare potassium fluorozincate to obtain certain particle sizes without a pulverizing step is not necessary to reject the claims, as a product and not the method of making that product is claimed (*id.* 10). The Examiner contends the range of particle sizes disclosed by Popoola encompasses or overlaps with the ranges claimed in claims 8, 10, and 11, and the range of particle sizes disclosed by Shimajiri falls within the range claimed in claim 12 (*id.* 10-12).

Appellants reply the Examiner fails to account for the compositional differences between the claimed alkali metal fluorozincate particles and the potassium aluminum fluoride flux particles of Popoola, resulting in "different properties including, *inter alia*, solid-liquid surface tension, wettability, solubility and/or particle-particle interaction, all of which will determine how such particles interact with a liquid spray media" (Reply Br. 2). Appellants contend the particle sizes of potassium fluoride and

aluminum fluoride mixtures in Shimajiri provides fluxes that are floatable in a furnace, which "would depend on other compositionally-dependent properties including, *inter alia*, mass density and/or particle-particle interaction" (*id.* 2-3). Appellants contend it cannot thus be inferred that the particles sizes disclosed by Popoola and Shimajiri can be used with the alkali metal fluorozincates of Seseke-Koyro and Shimajiri because Popoola teaches depositing potassium aluminum fluoride fluxes in a liquid suspension and Shimajiri discloses potassium fluoride/aluminum fluoride complexes in a gaseous suspension of the flux (*id.* 3).

The issue with respect to each ground of rejection is whether the Examiner has carried the burden of establishing a prima facie case.

The plain language of each of independent claims 8, 11, and 12 specifies an alkali metal fluorozincate produced by reacting a different three ingredient combination of the four ingredients alkali metal hydroxide, zinc oxide, alkali metal fluoride and hydrogen fluoride: in claim 8, alkali metal hydroxide and zinc oxide are mixed and hydrogen fluoride added thereto; in claim 11, hydrogen fluoride and zinc oxide are mixed and alkali metal hydroxide added thereto; and in claim 12, hydrogen fluoride and zinc oxide are mixed and alkali metal fluoride added thereto. Thus, the claims are couched in product-by-process format. S*ee, e.g.*, *In re Thorpe*, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). The only property of the respective products specified in each of the independent claims is a different grain spectrum based on the diameter of 50% of all particles wherein the diameter is < 5 μm in claim 8, < 11 μm in claim 11, and > 11 μm in claim

12. Claim 10, dependent on claim 8, specifies a reaction product having a grain spectrum based on 50% of all particles having a diameter of < 3.8 µm.

We find Seseke-Koyro '221 would have disclosed to one of ordinary skill in this art a method for brazing aluminum and aluminum alloys at a temperature range of 420°C to 590°C using a fluxing agent containing alkali metal fluorozincates or mixtures of alkali metal fluoride and zinc fluoride as the flux, wherein the alkali metal can be potassium and the alkali metal fluorozincates providing better brazing (Seseke-Koyro '221, e.g., abstract and col. 2, ll. 1-42). The fluxing agent can contain other fluxing agents as well as auxiliary materials, such as, "[f]or example, . . . a mixture of alkali [metal] fluorozincate and alkali fluoroaluminate, such as potassium fluoroaluminate," which "can be employed very well" (*id.*, e.g., col. 2, ll. 43-61, col. 3, ll. 5-27, and col. 4, l. 44, to col. 5, l. 35). "The fluxing agent can be applied in a known manner" such as "[a] dry application based on electrostatic spraying technology . . . because of the good fluidizing properties of the fluxing agents," and "in the form of aqueous or organic suspensions or as a paste" (*id.*, e.g., col. 3, l. 50, to col. 4, l. 28).

We find Seseke-Koyro '221 further discloses "[i]f, in addition to the alkali fluorozincate and brazing metal or brazing metal precursor, alkali fluoroaluminate is contained in the fluxing agent, the amounts preferably are 5 to 90 wt.-% of alkali fluorozincate, 5 to 90 wt.-% of solder or brazing metal precursor and 5 to 90 wt.-% of alkali fluoroaluminate" (Seseke-Koyro '221, e.g., col. 4, l. 66, to col. 5, l. 4). A flux of potassium fluorozincate prepared in Example 1, designated "JF 009400", and Nocolok®, which is potassium fluoroaluminate, is illustrated in a brazing test as

"JF 009400/ Nocolok®" in a "1:1 mixture" (e.g., col. 6, ll. 32-41, col. 8, ll. 40-41, and cols. 9-10). In the brazing tests, the mixture of potassium fluorozincate and potassium fluoroaluminate is mixed with isopropanol for application to an aluminum coupon (*id.*, e.g., col. 8, ll. 26-31).

We find Lauzon would have disclosed to one of ordinary skill in this art a method for brazing aluminum and aluminum alloys using aqueous flux preparations selected from the group consisting of, inter alia, potassium fluorozincate and potassium fluoroaluminate, and mixtures thereof (Lauzon col. 1, l. 5, to col. 2, l. 41). The aqueous flux preparation is applied by spraying the components to be brazed at approximately 600°C (*id.* col. 2, ll. 45-56).

We find Popoola would have disclosed to one of ordinary skill in this art a method for brazing aluminum and aluminum alloys including spraying a flux material onto the metal surface, wherein the flux can be "a eutectic of potassium aluminum fluoride containing up to 50 molar % of other fluoride salts . . . applied as a solution utilizing water or alcohol solvents" (Popoola col. 2, ll. 3-22). "The eutectic has a melting point of about 560°C" and "[o]ther double fluoride salts . . . can be used as long as they have a melting temperature that can be heat activated without disturbing the case aluminum alloy" (*id.* col. 3, ll. 15-31). "[T]he particle size of the fluoride salts is preferably controlled to less than 10 micrometers, with at least 70% of such salts being in the particle size range of 2-4 micrometers resulting in 20-30%, by volume, of the particles remaining in suspension at all times without stirring" for spraying (*id.* col. 2, ll. 23-27, and col. 3, ll. 42-59).

We find Shimajiri would have disclosed to one of ordinary skill in this art a method for brazing aluminum and aluminum alloys including suspending a flux in nonoxidizing gaseous medium gas in a furnace so it deposits on the material to be brazed, electrostatically spraying the flux onto the material to be brazed before heating in the furnace, and a combination of these methods (Shimajiri, e.g., col. 1, l. 63, to col. 2, l. 4, col. 2, l. 43-55, and col. 4, ll. 26-44). The flux in either method "can be any kind, and have any composition, provided it is effective for brazing" and can be "[a] fluoride-base flux," such as potassium fluoroaluminate (*id.,* col. 2, ll. 32-42). In the flux suspending method, the flux is pulverized to 2.0 to 80.0 μm in diameter to float in the furnace gas, with pulverized flux illustrated at a grain size of 15 μm on average (*id.,* col. 2, l. 55, to col. 3, l. 59, col. 4, ll. 55-57, and Example 1). In the electrostatic flux deposition method employing a spray gun, the flux is pulverized to a particle size range of 6.0 to 75.0 μm, preferably with on average 50% by volume having a range of 6.0 to 50.0, with an illustrated grain size of 15 μm on average in Example 2 and a range of grain sizes from 5 to 100 μm in Specimens 20 through 27 in Example 3 at 600-620°C (*id.,* col. 3, l. 60, to col. 4, l. 15, and Examples 2-5).

We find Appellants acknowledge in the "Background of the Invention" that "[a]kali metal fluorozincates such as . . . potassium fluorozincate, may be used as fluxing agents for brazing" components of aluminum and aluminum alloys, and "may also be used together with alkali fluoroaluminates, for example potassium fluoroaluminate," which

"compounds also act as fluxing agents for brazing aluminum" (Specification, ¶ 0003).[4]

We determine the Examiner has established a prima facie case in each of the grounds of rejection. We have difficulty with Appellants' contentions based on unidentified differences in properties between potassium fluorozincate and potassium fluoroaluminate, both known compounds for use in flux preparations for brazing aluminum and aluminum alloys as acknowledged by Appellants, Seseke-Koyro '221 and Lauzon. Indeed, at most, Appellants merely state several properties which can be considered in employing these materials in flux preparations for different applications (Reply Br. 2; *see above* p. 7).

Contrary to Appellants' position is the disclosure in both Seseke-Koyro '221 and Lauzon that potassium fluorozincate and potassium fluoroaluminate can be used separately and combined in flux preparations for the wet and dry applications taught therein, and the disclosure in Popoola and Shimajiri that fluoride salts without limitation can be used in the wet and dry applications disclosed therein. Indeed, Seseke-Koyro '221 discloses that potassium fluorozincate and potassium fluoroaluminate can be combined in the same and different amounts in flux preparations and illustrates a 1:1 mixture of these materials. Seseke-Koyro '221 further discloses the flux compositions disclosed therein can be applied by

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[4] *See In re Nomiya*, 509 F.2d 566, 570-71, 571 n.5, 184 USPQ 607, 611, 611 n.4 (CCPA 1975) (Appellants' representations in their application should be accepted at face value as admissions that Figs. 1 and 2 may be considered "prior art" under § 103, conceding what is to be considered as prior art in determining obviousness of their improvement).

electrostatic spray technology as does Shimajiri, and as an aqueous or organic suspension or paste as does Popoola, the brazing effected in substantially the same range of temperatures. Lauzon discloses that potassium fluorozincate and potassium fluoroaluminate can be combined in aqueous flux compositions for application by spraying as does Popoola, the brazing effected in substantially the same range of temperatures.

Thus, on this record, we determine that one of ordinary skill in this art would have found in the combined teachings of Seseke-Koyro '221, Lauzon, and Popoola and of Seseke-Koyro '221, Lauzon, and Shimajiri the motivation to combine the references, and thence to employ potassium fluorozincate in the wet and dry applications of fluoride salts taught in the references in the gain size ranges disclosed by Popoola and Shimajiri in the reasonable expectation of successful performance in the brazing methods taught in the references. Therefore, we are of the opinion that one of ordinary skill in this art routinely following the combined teachings of the references as applied would have reasonably arrived at the claimed potassium fluorozincate encompassed by claims 8 and 10 through 12 without recourse to Appellants' Specification. *See, e.g., In re Kahn*, 441 F.3d 977, 985-88, 78 USPQ2d 1329, 1334-37 (Fed. Cir. 2006); *In re Keller*, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981)("The test for obviousness is not whether . . . the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.").

We recognize that the method of preparing the flux preparation which includes a pulverizing step taught in the applied prior art as relied on by the Examiner is not the method specified in any of claims 8, 11 and 12 as Appellants contend. As the Examiner contends, the claims are product-by-process claims with only the reagents and the order of combining the same to obtain the claimed product having the specified grain spectrums to characterize the claimed products. Appellants have not established by evidence or effective argument that the claimed products patentably distinguish over the products obtained with a pulverizing step taught in the applied prior art. *See, e.g., Thorpe*, 777 F.2d at 697, 227 USPQ at 966 (Fed. Cir. 1985); *In re Best*, 562 F.2d 1252, 1254-56, 195 USPQ 430, 433-34 (CCPA 1977).

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in the combined teachings of Seseke-Koyro '641, Lauzon, and Popoola and of Seseke-Koyro '641, Lauzon, and Shimajiri with Appellants' countervailing evidence of and argument for nonobviousness, and conclude that the claimed invention encompassed by appealed claims 8 through 12 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The Primary Examiner's decision is affirmed.

OTHER ISSUES

We suggest the Examiner consider the following issues upon any further prosecution of the appealed claims subsequent to the disposition of this appeal.

We determine each of independent claims 8, 11, and 12 characterize the products claimed therein by specifying the preparation thereof by combining at least three of the four recited ingredients in the specified manner.

We find Example 1 of Seseke-Koyro '641 as shown by Seseke-Koyro '221, would have disclosed reacting zinc oxide with aqueous hydrogen fluoride, that is, hydrofluoric acid, to which potassium fluoride/hydrofluoric acid is added to obtain potassium fluorozincate (Seseke-Koyro '221 col. 6, ll. 34-41). We recognize this disclosure does not state the grain spectrum of the particles obtained. However, the method illustrated in reference Example 1 uses the same ingredients in the same steps as claimed, and thus there is no evidence in the record which establishes that a different result would obtain by following the method of Example 1. *See In re Sussman*, 141 F.2d 267, 269-70, 60 USPQ 538, 541 (CCPA 1944) ("[I]f appellant obtains a new product through reaction of the elements mentioned, it must be due to some step in the process not included in the claim.").

The Examiner should determine whether this disclosure in Seseke-Koyro '641 renders appealed claim 12 anticipated under 35 U.S.C. § 102(b) or, in the alternative, obvious under 35 U.S.C. § 103(a). *See, e.g., In re Spada*, 911 F.2d 705, 708-09, 15 USPQ2d 1655, 1657-58 (Fed. Cir. 1990); *Best*, 562 F.2d at 1254-56, 195 USPQ at 433-34; *In re Skoner*, 517 F.2d 947, 950-51, 186 USPQ 80, 82-83 (CCPA 1975) ("Appellants have chosen to describe their invention in terms of certain physical characteristics . . . . Merely choosing to describe their invention in this manner does not render

patentable their method which is clearly obvious in view of [the reference]." (citation omitted)).

We further find the paragraph bridging pages 9-10 and Examples 2-7 of Seseke-Koyro '641 as shown by Seseke-Koyro '221 (Seseke-Koyro '221, e.g., col. 5, ll. 42-58, and cols. 6-8), would have disclosed methods of reacting ingredients and obtaining those ingredients which would result in potassium fluorozincate.

The Examiner should determine whether this disclosure in Seseke-Koyro '641 alone or as combined with other prior art developed by the Examiner, renders appealed claims 8 through 12 obvious under 35 U.S.C. § 103(a). *See, e.g., Best*, 562 F.2d at 1254-56, 195 USPQ at 433-34; *Skoner*, 517 F.2d at 950-51, 186 USPQ at 82-83.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2005).

AFFIRMED

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Crowell & Moring LLP
Intellectual Property Group
P.O. Box 14300
Washington, DC 20044-4300